DOCUMENT RESUME

ED 202 728 SE 035 155

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TITLE	Getting to Know Your Local Fish. Student Guide and Teacher Guide. OEAGLS Investigation 23.
INSTITUTION	Ohio State Univ., Columbus. Research Foundation.
SPONS AGENCY	National Oceanic and Atmospheric Administration (DOC), Rockville, Md.
PUB DATE	Aug 80
GRANT	NOAA-04-8-M01-170; NOAA-04-158-44099; NOAA-NA-79AA-D-00120
NOTE	41p.; For related documents, see SE 035 140-154 and ED 179 352-358. Prepared in collaboration with the Ohio Sea Grant Program.
AVAILABLE FROM	Ohio Sea Grant Education Office, 283 Arps Hall, Ohio State Univ., 1945 N. High St., Columbus, OH 43210 ($1.00 plus $1.00 per order for shipping).
EDRS PRICE	MF01/PC02 Plus Postage.
DESCRIPTORS	*Animals; Art Activities; Biology; *Classification; *Elementary Secondary Education; Environmental Education; *Fisheries; Science Course Improvement Projects; *Science Education; Water Resources
IDENTIFIERS	Great Lakes; *Icthyology; *Oceanic Education Activities Great Lakes Schools; Ohio Sea Grant Program

ABSTRACT

Described in this unit are three activities related to classification and fish identification. In the first activity students design and use a dichotomous key to common classroom items, while Activity B involves the construction of a key to Lake Erie fish families. During Activity C, each student writes a story and draws a humorous picture of a fish based on its common name. Both a student workbook and teacher's guide are provided. The latter includes objectives, teaching suggestions, line drawings of Lake Erie fishes and an answer key. (WB)

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Oceanic Education Activities for Great Lakes Schools

GETTING TO KNOW YOUR LOCAL FISH

by

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SE 035 155

OEAGLS Investigation #23
Completed August, 1980

This instructional activity was prepared with the support of National Oceanic and Atmospheric Administration Grant Nos. 04-158-44099, 04-8-M01-170 and NA 79AA-D-00120, and from The Ohio State University. However, any opinions, findings, conclusions, or recommendations expressed herein are those of the authors, and do not necessarily reflect the views of NOAA or the University.

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GETTING TO KNOW YOUR LOCAL FISH

INTRODUCTION

Lake Erie has a larger variety of fish life than any of the other Great Lakes. Scientists believe this is because of the southern position of the lake and because it is shallow. Lake Erie has 138 species of fish. These species can be grouped into 27 families. All of the fish in a given family share certain characteristics. In this exercise you will learn how to use these characteristics to identify the 27 families.

OBJECTIVES

When you have completed these activities, you should be able to:

1. Develop and use a dichotomous key.
2. List some characteristics of fish in general.
3. List some ways in which the 27 families of Lake Erie fish are different from each other.

ACTIVITY A

HOW DOES A DICHOTOMOUS KEY WORK?

This activity will introduce you to a dichotomous (die-caht'-uh-mus) key. A dichotomous key is a key in which things are divided into two groups each time a characteristic is considered. The prefix "di" means two, and the whole word "dichotomous" refers to something with two parts or branches. Scientists use "keys" to identify things and put them into groups on the basis of how they are alike.

MATERIALS

Paper clip, pen, pencil, two different coins, rubber band

PROCEDURE

Look at the example of a dichotomous key shown on page 2. At the top are pictures of four items to be classified. The maker of the key looked at the items and decided that they were different in a number of ways. These differences are listed as pairs of characteristics on the left side of the key. The right side of the key identifies the item or tells you what step to go to next if an item has a certain characteristic.

Let's classify the second item as an example. Look at Step 1 of the key and decide if the pictured item is a living or nonliving thing. Since the picture shows a living thing, read across line 1A to the right hand column to find the next step or the identification. You are told to go to Step 2.

In Step 2, from what you know about the thing you are classifying, decide if the thing can make its own food or not. Since it cannot, read across line 2B, which tells you to go to Step 3.

In Step 3, you must decide if the thing has fur or not. Since it does, reading across line 3A brings you to the identification, cat.

Key

Characteristic		Next step or identification
1A.	Living	2
B.	Non-living	Block
2A.	Makes its own food	Plant
B.	Cannot make its own food	3
3A.	Body covered with fur	Cat
B.	No fur	Duck

Now try making a dichotomous key yourself using the six items listed in the MATERIALS section. Look at the items and decide how they are different and alike. Statement one is given as an idea to get you started. Fill in other pairs of characteristics for other statements until you have identified all six items.

Characteristic		Next step or identification
1A.	Will make a mark on paper	2
B.	Will <u>not</u> make a mark on paper	3

ACTIVITY B

WHAT ARE THE CHARACTERISTICS OF SOME LAKE ERIE FISH?

Now that you know how to construct a dichotomous key, let's try one that uses real organisms--the fish in Lake Erie. For this activity you will work in groups of 4 or 5. Your group will construct a key to identify some fish families and learn something about them.

MATERIALS

Fish pictures and information about fish families.

PROCEDURES

Regardless of whether they live in an ocean, lake or stream, all fish are alike in some ways. A typical bony fish has scales embedded in its skin. These scales have concentric growth rings. The rings can be counted to determine the age of the fish.

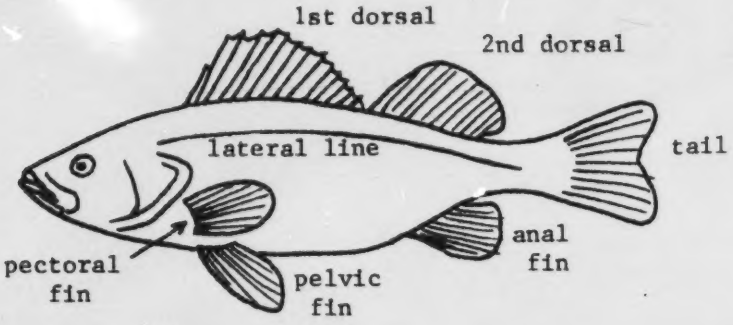
A few fish <u>do not</u> have any scales.

Fish also have gills. When the fish swims, water enters the mouth and then goes out through the gills. As water passes over the gills, oxygen dissolved in the water is exchanged for carbon dioxide from the fish's blood.

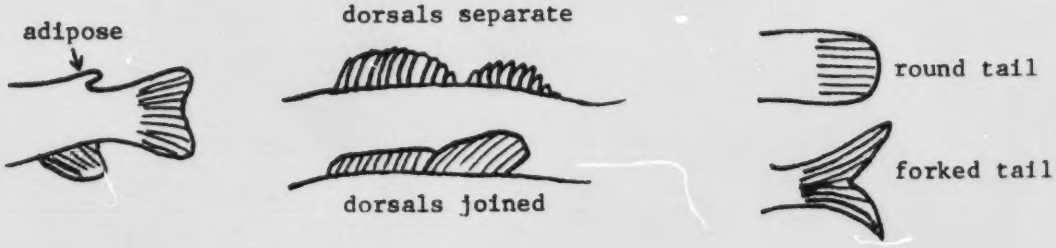
Fish differ from each other in several characteristics. Study the following diagrams so you can recognize differences when you get your fish pictures from your teacher. Refer to the GLOSSARY on page 5 to find definitions of terms you do not understand from the pictures.

Fish Characteristics

Where the fins are:



Fin types:

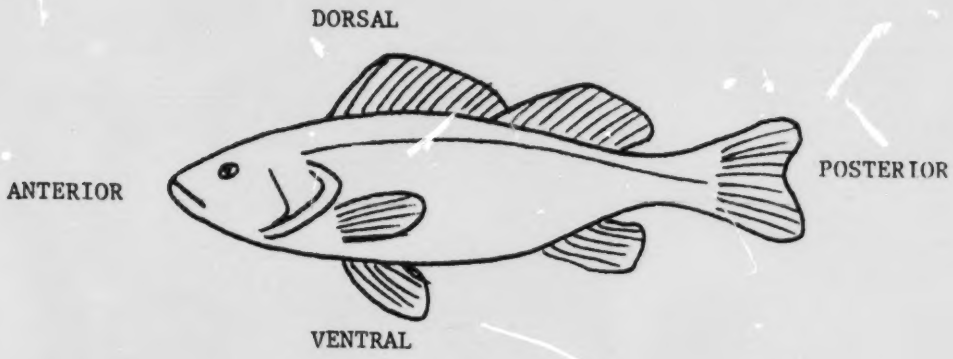


Head features:

Also look for differences in:

Body shapes (wide, narrow; slender, fat)
Lateral line (present or absent)
Spines (present or absent, and position)
Spots or stripes
Head shapes
Fin shapes

GLOSSARY



Adipose Fin - fleshy fin behind the dorsal fin.

Anterior - front.

Barbels (pronounced bar-bulls) - whiskers that help the fish detect food.

Carnivore - flesh eating animal.

Commercial Fish - fish caught for commercial trade.

Concentric - having a center in common. Example: growth rings on a tree.

Dorsal - pertaining to the back.

Filter Feeder - filters microscopic plants and animals from the water for food.

Forage Fish - fish used as food by larger fish.

Lateral Line - A row of sensory organs along each side of the head and body of most fish. It looks like a dotted line.

Omnivore - an animal that eats any sort of food, plant or animal.

Parasite - an organism living in or on another organism (its host) from which it obtains food.

Pectoral - the anterior, ventral position.

Pelvic - the posterior, ventral position.

Posterior - rear.

Scales - flexible overlapping plates that cover the bodies of some fish. Scales help to protect the fish.

Sport fish - fish that are caught by individuals for recreation.

Ventral - pertaining to the stomach.

1. Look at the fish pictures with your group. List the names of the fish you are working with.

   a. _____

   b. _____

   c. _____

   d. _____

   e. _____

   f. _____

2. How are your fish different from each other? List four general ways (head shape, spines, etc.).

   a. _____

   b. _____

   c. _____

   d. _____

3. Cut your picture sheet into sections so that each piece contains only one fish. With your team, decide how to divide the fish into two groups based on one characteristic. Put the fish pictures in two piles according to that characteristic, which will be Statement 1 of your key. On the next page, fill in 1A and B, with the next steps or identification on the right side.

4. Next, take the fish in one pile and discuss how they differ from each other. Fill in Statement 2.

5. Continue dividing your fish in this way until each group has only one fish in it. When you reach this point, the right hand column should be filled in with the fish's name.

6. Check your finished key when all your fish have been classified. You should be able to pick up any fish picture and follow the key to find the name of the fish.

Key to Lake Erie Fish

Characteristic	Next step or identification
1A.	
B.	
2A.	
B.	

7. Exchange keys and fish pictures with another group. Do not give the list of fish names from the original sheet to the other team. See if they can identify the fish using only your descriptions in your key.

8. Get your original fish pictures and key back again when the other team is finished. Read the Fish Family Descriptions your teacher has given you. Tell the class how you grouped your fish and a little about each fish.

9. From the group reports, answer these questions.

   A. What fish is covered with bony plates?

   _____

   B. How do lampreys damage other fish?

   _____

   C. How does a filter-feeding fish eat?

   _____

   _____

D. Describe a major characteristic of a bowfin.

_____

E. How do herrings differ from other Lake Erie fish?

_____

F. List 5 Lake Erie fish that are valuable as food for humans.

_____ _____ _____

_____ _____

G. How did the sucker family get its name?

_____

H. Name two Lake Erie fish that have no scales.

_____ _____

I. How did the freshwater drum get its name?

_____

J. Name two kinds of Lake Erie fish that are used as bait for fishing.

_____ _____

10. If time permits, work with the entire class to develop a key that will classify all 27 families of Lake Erie fish.

ACTIVITY C

HOW DO FISH GET THEIR NAMES?

You have discovered that some fish in Lake Erie are named for the way they look (stickleback, bowfin, and others). For others, it is difficult to determine how they got their common names. In this activity, you will make up stories and draw pictures about how a fish might have gotten its name.

MATERIALS

Paper and pencil

PROCEDURE

You have seen pictures of how the fish in Lake Erie really look. But suppose you had never seen a fish and only knew its common name. You might guess that the fish's name had something to do with how it looks, how it behaves, or maybe where it lives.

1. Listed below are some common names of Lake Erie fish and ocean animals. Choose one name from either list. What fish did you choose?

_____

Lake Erie Fish	Ocean Animals
1. Freshwater drum	1. Hammerhead shark
2. Madtom	2. Hatchetfish
3. Catfish	3. Swordfish
4. Mudminnow	4. Dogfish
5. Walleye	5. Starfish
6. Pirate-perch	6. Pipefish
7. Sunfish	7. Jellyfish
8. Paddlefish	8. Parrotfish
9. Mooneye	9. Queen triggerfish
10. Bigmouth buffalo	10. Porcupinefish
11. Silverside	11. Sea robin
12. Bullhead	12. Toadfish
13. Mosquitofish	13. Clownfish

2. On your own paper, draw a funny picture about how that fish might look, based on its name. Your drawing needs to have some basic fish characteristics: pair of eyes, tailfin, mouth and some normal fin arrangement.

3. Write a short story (one or two paragraphs) about how the fish you chose got its name.

REVIEW QUESTIONS

1. How do scientists use a dichotomous key?

_____

_____

2. List three characteristics of fish in general.

_____

_____

_____

3. List five ways in which the families of Lake Erie fish differ from each other.

_____

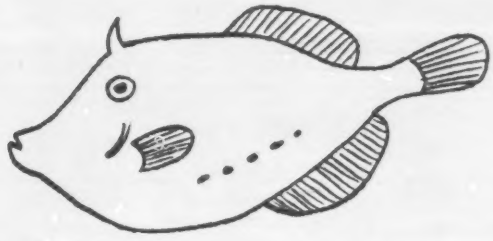
_____

_____

_____

_____

4. Identify this fish using the key below.



Fish's name _____

Key

1A.	Rounded tail	2
B.	Forked tail	Reef fish
2A.	Mouth on top	3
B.	Mouth on bottom	Toadfish
3A.	Wide vertical stripes	Spadefish
B.	No stripes	4
4A.	Pelvic fins	Tripletail
B.	No pelvic fins	Filefish

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TEACHER GUIDE

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INVESTIGATION — GETTING TO KNOW YOUR LOCAL FISH

OVERVIEW

This investigation consists of three activities. Activity A is designed to teach students how to make and use a dichotomous key. Common classroom items are used in this introductory section.

In Activity B, students use their new skill to construct a key to five or six families of Lake Erie fish, and the class can pool results to make a key to all 27 families of fish found in the lake.

Finally, Activity C is a creative art and writing experience. Based on the common name of an ocean or lake fish, each student draws a funny picture of the fish and writes a story about how it got its name.

PREREQUISITE STUDENT BACKGROUND

None

MATERIALS

For every group of 4-5 students: one paper clip, pen, pencil, rubber band, pair of scissors, and two different coins.

OBJECTIVES

When students have completed this investigation, they should be able to:

1. Develop and use a dichotomous key;
2. List some characteristics of fish in general; and
3. List some ways in which the 27 families of Lake Erie fish are different from each other.

SUGGESTED APPROACH

The "keying out" process is a difficult one for many middle school students to grasp. It is suggested that you go over the procedure for Activity A step by step with the class, then divide them into groups of 4 or 5 for completion of the activity. Activity A will take about one hour.

The same group from Activity A should be used for Activity B. This part will take longer because of time needed for reporting to the class on fish family characteristics. If the class chooses to make a key for all the fish, count on a total of two hours for Activity B.

Activity C is done individually and could be assigned for homework or completion during spare time. Displaying the art work and sharing clever stories may create further interest in the origin of names.

An enjoyable film related to this topic is "Classification," from the University of Utah at Salt Lake City 84112. The 29 minute film shows different ways of classifying familiar objects. It would provide an excellent introduction to this investigation.

ACTIVITY A HOW DOES A DICHOTOMOUS KEY WORK?

PROCEDURE

Keywords: dichotomous, key, classify

Please work with the students closely on this activity to help insure their understanding. Activity B will fail if Activity A is only marginally understood.

Follow the procedure carefully, emphasizing that only one characteristics at a time is used to classify items, and two groups are constructed based on that one characteristic. The two groups are subdivided further and further until only one item remains in a group. That item is then identified.

By looking back through the steps used to key out an item, you can get a list of the item's characteristics. Cat, for example, is living, cannot make its own food, and has a body covered with fur.

If necessary, key out all four items in the example to assure that students understand. You may also have to lead them through several steps in construction of a key to identify the 6 items listed in the materials section of the Student Guide. It is helpful to have the students physically group the items as they are discussed--one pile for writing implements, one pile for "everything else." Then separate the writing implements by color of mark made, plastic or wood, color of the implement, or other characteristics, and identify each. Step 3 will be a way to divide "everything else" into two groups, and so on.

An example of one possible key is shown here. Many variations are possible. The best way to check a key is to give the key and one item to someone else. That person should be able to list the steps followed to reach an identification of the item.

SCHOOL SUPPLIES KEY
(POSSIBLE)

Characteristic	Next step or identification
1A. Will make a mark on paper	2
B. Will not make a mark on paper	3
2A. Made mostly of wood	pencil
B. Made mostly of plastic	pen
3A. Made of metal	4
B. Not made of metal	rubber band
4A. Disc shaped	5
B. Not disc shaped	paper clip
5A Silver color	dime
B. Brown color	penny

ACTIVITY B — WHAT ARE THE CHARACTERISTICS OF SOME LAKE ERIE FISH?

PROCEDURE

Go over the fish characteristics on page 4 with students to make sure they are aware of what differences to look for. Remind them of the glossary (page 5), not only for use in looking up unfamiliar words, but for choosing descriptive words to use in their key.

The procedure in the Student Guide is self-explanatory. The Teacher Guide includes two pages (one with pictures of fish, one with descriptions) for each of five teams. Please look over the fish pictures to be sure that you can point out different characteristics of fish if students have difficulty. Both the pictures and the written descriptions can be used to describe differences.

Answers to questions 1 and 2 will differ from team to team. The questions are given mainly as advance organizers and to guide you if you are giving a grade for this activity.

The "Key to Lake Erie Fish" will also differ from team to team. An example is given here using Group III. See Appendix for sample keys to other groups.

Characteristic	Next step or identification
1A. Lateral line	2
B. No lateral line	4
2A. Forked tail	Salmon
B. Rounded tail	3
3A. Long dorsal fin	Bowfin
B. Short dorsal fin	Pirate Perch

4A. Vertical stripes on sides	Killifish
B. No stripes	5
5A. Long narrow anal fin	Livebearer
B. Short anal fin	Mudminnow

The exchange of keys and pictures with another group is a good way to find out if the keys will work. It also exposes students to other possible ways of distinguishing between fish.

In Step 8, try to have each student tell about one family of fish. A representative of the group can then tell how the fish were keyed.

Answers to Step 9 should be filled in during the individual reports.

9A. Sturgeon are covered with bony plates.

B. The parasitic lampreys attach to other fish and feed on them.

C. It filters microscopic organisms from the water. (Such fish collect the organisms on gill rakers and then remove them with the tongue or by back-flushing water through the gills. The food can then be swallowed.)

D. It has a long fin that arches in a bow along its back.

E. They have a sawtooth belly and are very rough to touch on the ventral side.

F. Sturgeon, Yellow Perch, White Bass, Burbot, Salmon, Walleye, Catfish are valuable as human food.

G. They have an extendable sucker mouth for picking or sucking up organisms.

H. Catfish, Eel, Sturgeon have no scales.

I. It makes a drumming sound.

J. Any two: Minnows, Mudminnows, Killifish, Sculpins, Silversides

10. When the students have constructed their own key and tried out the key made by another team, they should be well aware of what differences to look for. Making a key to all the fish should not be difficult at this point. If you want to try this, we suggest that you have students write the name of each fish on its picture, then tape all the pictures to the blackboard. Have students volunteer to divide the fish into groups to create a key, one step at a time.

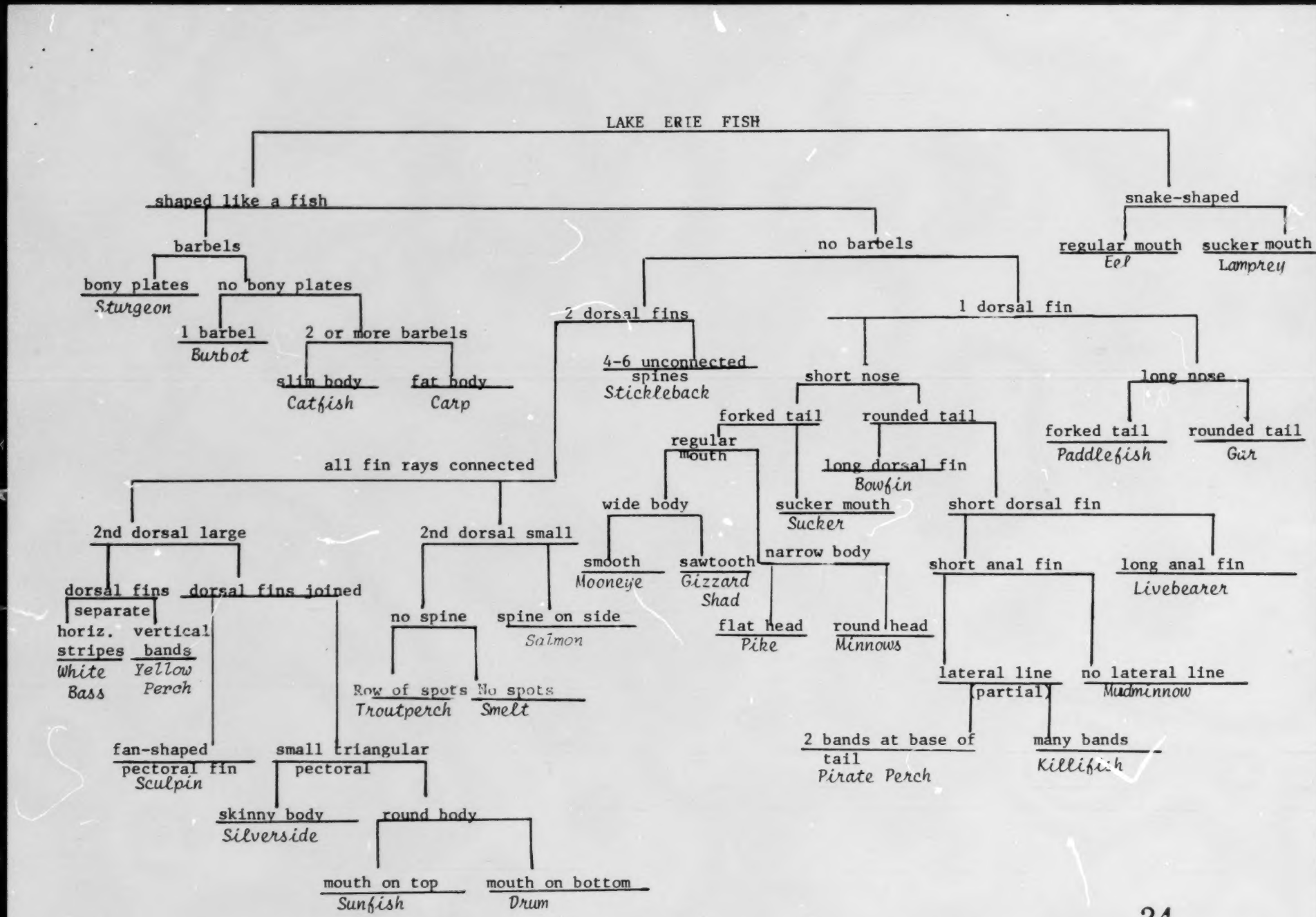
If you prefer to use the overhead projector, page 9 has pictures of all of the fish. Make a transparency of that page and cut it apart so you can physically group the fish as the key is constructed.

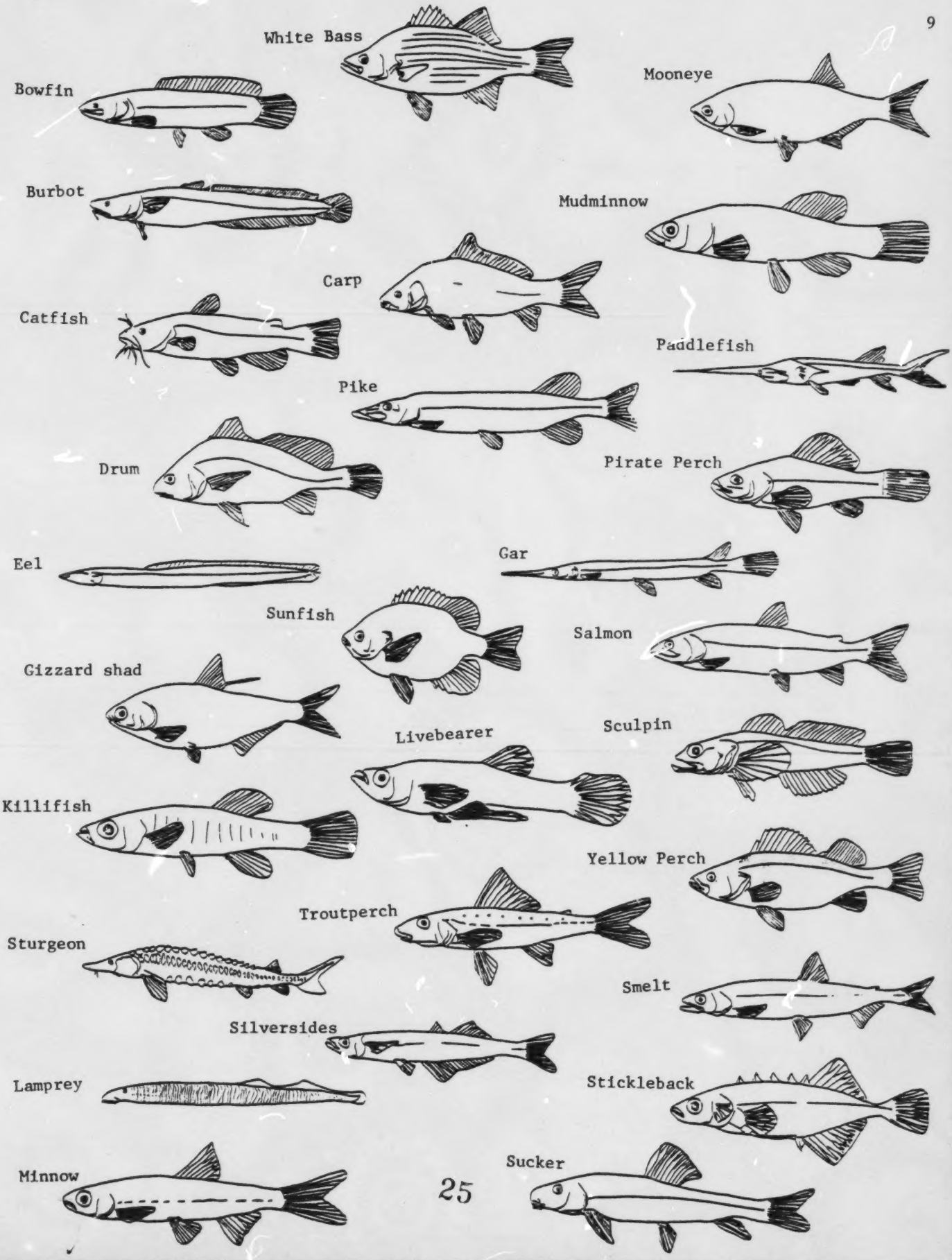
One possible way to group all the fish is shown on the next page. A graphic way to show the same classification scheme is on page 8.

Lake Erie Fish
(Possible Key)

Characteristic		Next step or identification
1A.	Snake-shaped	2
B.	Shaped like a fish	3
2A.	Regular mouth	Eel
B.	Sucker mouth	Lamprey
3A.	Barbels	4
B.	No Barbels	7
4A.	Bony plates	Sturgeon
B.	No Bony plates	5
5A.	One barbel	Burbot
B.	Two or more barbels	6
6A.	Slim body	Catfish
B.	Fat body	Carp
7A.	Two dorsal fins	8
B.	One dorsal fin	17
8A.	All fin rays connected	9
B.	Four to six unconnected spines	Stickleback
9A.	Second dorsal large	10
B.	Second dorsal small	15
10A.	Dorsal fins separate	11
B.	Dorsal fins joined	12
11A.	Horizontal stripes	White Bass
B.	Vertical color bands	Yellow Perch
12A.	Fan-shaped pectoral fin	Sculpin
B.	Small triangular pectorals	13
13A.	Skinny body	Silverside
B.	Round body	14
14A.	Mouth on top	Sunfish
B.	Mouth on bottom	Drum
15A.	No spines	16
B.	Spine on side	Salmon
16A.	Row of spots	Troutperch
B.	No spots	Smelt

17A.	Short nose	19
B.	Long nose	18
18A.	Forked tail	Paddlefish
B.	Rounded tail	Gar
19A.	Forked tail	20
B.	Rounded tail	24
20A.	Regular mouth	21
B.	Sucker mouth	Sucker
21A.	Wide body	22
B.	Narrow body	23
22A.	Smooth belly	Mooneye
B.	Sawtooth belly	Gizzard Shad
23A.	Flat head	Pike
B.	Round head	Minnows
24A.	Long dorsal fin	Bowfin
B.	Short dorsal fin	25
25A.	Short anal fin	26
B.	Long anal fin	Livebearer
26A.	Lateral line (partial)	27
B.	No lateral line	Mudminnow
27A.	Two bands at base of tail	Pirate Perch
B.	Many bands	Killifish


LAKE ERIE FISH
shaped like a fish
snake-shaped
barbels
no barbels
regular mouth
Eel
sucker mouth
Lamprey
bony plates
Sturgeon
no bony plates
2 dorsal fins
1 dorsal fin
1 barbel
Burbot
2 or more barbels
4-6 unconnected spines
Stickleback
short nose
long nose
slim body
Catfish
fat body
Carp
forked tail
rounded tail
forked tail
Paddlefish
rounded tail
Gar
regular mouth
long dorsal fin
Bowfin
all fin rays connected
wide body
sucker mouth
Sucker
short dorsal fin
2nd dorsal large
2nd dorsal small
smooth
Mooneye
sawtooth
Gizzard Shad
narrow body
short anal fin
long anal fin
Livebearer
dorsal fins
dorsal fins joined
separate
no spine
spine on side
Salmon
flat head
Pike
round head
Minnows
horiz. stripes
White Bass
vertical bands
Yellow Perch
lateral line (partial)
no lateral line
Mudminnow
Row of spots
Trout perch
No spots
Smelt
2 bands at base of tail
Pirate Perch
many bands
Killifish
fan-shaped pectoral fin
Sculpin
small triangular pectoral
skinny body
Silverside
round body
mouth on top
Sunfish
mouth on bottom
Drum


White Bass
Bowfin
Mooneye
Burbot
Mudminnow
Carp
Catfish
Paddlefish
Pike
Drum
Pirate Perch
Eel
Gar
Sunfish
Salmon
Gizzard shad
Livebearer
Sculpin
Killifish
Yellow Perch
Troutperch
Sturgeon
Smelt
Silversides
Lamprey
Stickleback
Minnow
Sucker

ACTIVITY C HOW DO FISH GET THEIR NAMES?

PROCEDURE

This activity is designed to stimulate imagination and creativity. Expect a wide range of answers, and maybe consider preparing a booklet of class results that could serve as an idea bank for future classes.

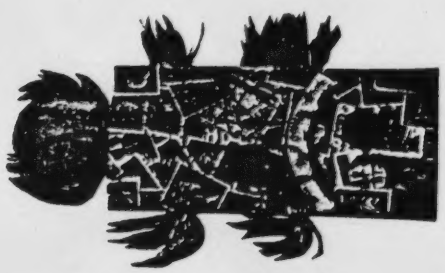
Some drawings that might result from instructions in Step 2 include these:

Drum Madtom Silver Bass Bullhead

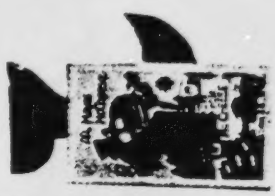
(Reproduced from "Fish Recipes for Lent," U. S. Department of the Interior, Bureau of Commercial Fisheries, 1961. FMB 2[illegible] 15 60.)

EXTENSIONS

This activity is adapted from a "Fishical Education" exercise developed by teacher Dottie Wendt at Waipahu High School, Waipahu, Hawaii. Ms. Wendt had her students write stories about the origin of some local fish names. She also had them construct a "boxfish" out of found materials from home. You may want to use her idea as an extension of this investigation. A few of her prize "specimens" are shown here.



Featherfinned philatelist



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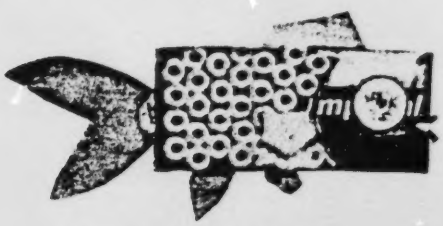
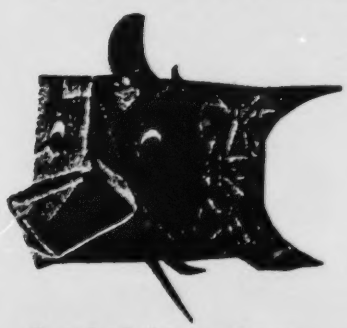


False butterfish



Psychedelic grinner

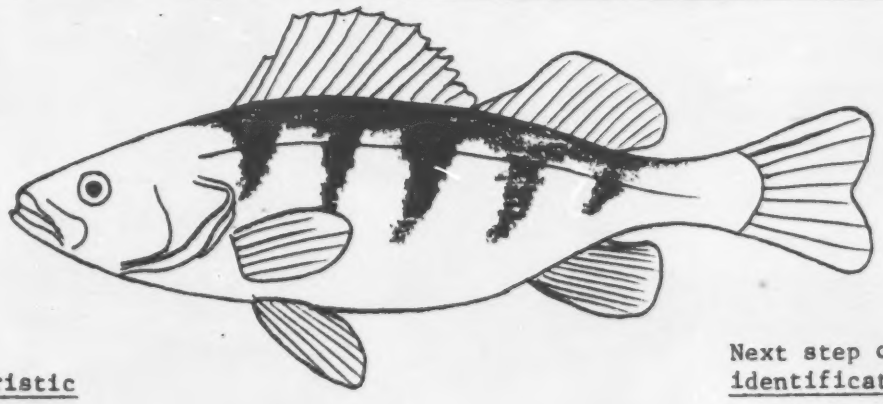
REVIEW QUESTIONS

1. The key is used to classify and identify organisms.
2. Fish have gills and paired fins and live in water. Most have scales.
3. Mouth position, number of dorsal fins, fin shape, barbels, spines, body markings, head shapes, lateral line, and body shapes differ.
4. Filefish.

REFERENCES

Milton B. Trautman, Fishes of Ohio, 2nd Edition, 1980.

EVALUATION ITEMS



Characteristic		Next step or identification
1A.	Lateral line	2
B.	No lateral line	Sunfish
2A.	Dorsal fins joined	Sculpin
B.	Dorsal fins separate	3
3A.	Rounded tail	Burbot
B.	Notched tail	Yellow Perch

Questions 1-3 refer to the box above.

1. The material inside the box is called a

   a. category chart.
   b. fish test.
   *c. dichotomous key.
   d. crosslisting guide.

2. Using the information in the box, you can

   a. find out some characteristics of all the fish named.
   b. find out some characteristics of the fish pictured.
   c. identify the fish pictured.
   *d. do all of the above.

3. The name of the fish pictured in the box is

   *a. Yellow Perch.
   b. Burbot.
   c. Sculpin.
   d. Sunfish.

4. Dorsal fins are found on a fish's

   a. ventral side.
   b. sides.
   *c. back.
   d. underside.

5. A lateral line is a

   a. mark that shows where the gills are located.
   b. line in a fin that helps make the fin stiff.
   c. dark stripe running all the way around a fish.
   *d. row of sense organs along the sides of some fish.

6. About how many families of fish live in Lake Erie?

   *a. 25-30
   b. 50
   c. Hundreds
   d. Thousands

7. A parasitic fish found in Lake Erie is the

   a. sculpin.
   b. livebearer.
   *c. lamprey.
   d. sucker.

8. An adipose fin is

   a. the thick flap that covers the gills.
   b. another name for the tail fin.
   *c. an extra fatty fin on the back of some fish.
   d. the ventral fin nearest a fish's tail.

9. Barbels are sometimes found on a fish's

   a. back.
   b. sides.
   c. tail.
   *d. head.

10. Which family of Lake Erie fish does <u>not</u> provide food for humans?

   *a. Killifish
   b. Herring
   c. Trout/Salmon
   d. Temperate Basses

11. Which family of Lake Erie fish is not commonly used as bait?

   a. Mudminnow
   *b. Sculpin
   c. Silversides
   d. Sunfish

12. The common name of a fish may be based on

   a. a sound it makes.
   b. where it lives.
   c. what it looks like.
   *d. any of the above.

APPENDIX

The following are possible keys for groups of fish labelled I, II, IV and V. There are many possibilities not given here that are equally good. Pleasebe aware of this and use these keys only as a guide.

Group I

1A.	sucker mouth	sucker
B.	no sucker mouth	2
2A.	head flat (or long snout)	3
B.	head not flat (or long snout)	5
3A.	head flat like a duck's bill	pike
B.	head with long snout	4
4A.	mouth under long snout	paddlefish
B.	mouth in long snout	gar
5A.	saw belly	gizzard shad
B.	belly smooth	mooneye

Group II

1A.	tail notched	2
B.	tail round	sculpin
2A.	pectoral fin pointed	3
B.	pectoral fin round	yellow perch
3A.	anal fin long	silversides
B.	anal fin short	4
4A.	deep notch in dorsal fin	white bass
B.	dorsal fin continuous	sunfish

Group IV

1A.	adipose fin present	2
B.	adipose fin absent	3
2A.	pelvic fin under pectoral fin	trout-perch
B.	pelvic fin behind pectoral fin	smelt
3A.	tail round	4
B.	tail notched	minnow
4A.	separate sharp spines in first dorsal fin	stickleback
B.	no separate sharp spines in first dorsal fin	drum

Group V

1A.	snakelike body	2
B.	fish shaped body	3
2A.	sucker mouth	lamprey
B.	regular mouth	eel
3A.	adipose fin	catfish
B.	no adipose fin	4
4A.	round tail	burbot
B.	notched tail	carp

I.

A. Mooneye Family - Hiodontidae

A silver to gold colored fish that is not considered very good to eat. Insects, insect larvae, and small minnows are the major foods of the mooneye.

B. Herring Family - Clupeidae

The saw toothed belly sets the herrings apart. They are plankton feeders. They serve as forage for sport and commercial fish. For example, walleyes often eat gizzard shad, a member of this family.

C. Pike Family - Esocidae

These predaceous fish feed on anything they can seize. They grow to 10-35 pounds, 2-7 feet long. They are a fierce game fish. They like warm, weedy rivers, ponds and lakes.

D. Sucker Family - Catostomidae

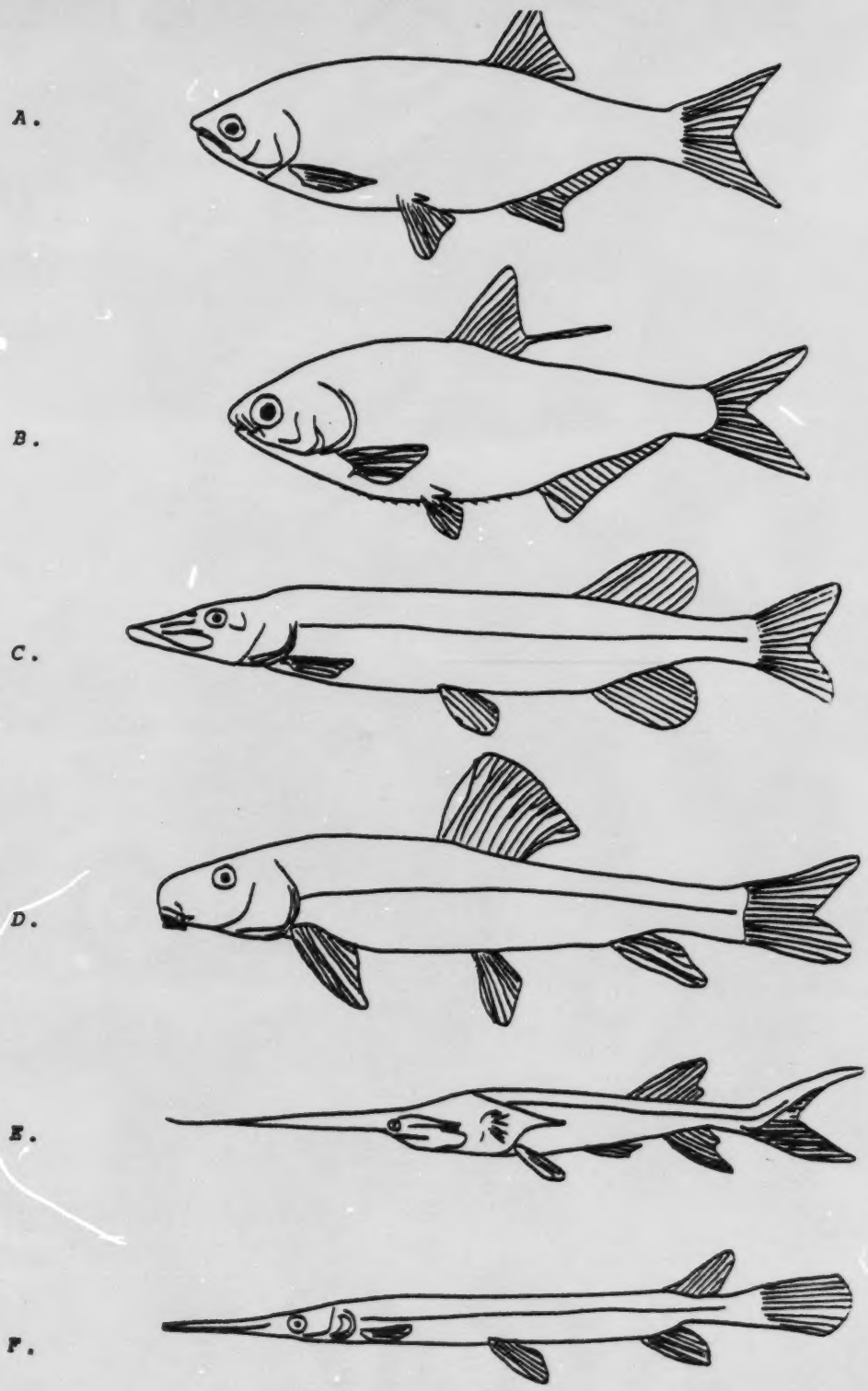
These fish live on the bottom of lakes, pond and streams. They have an extendible sucking mouth, and feed by suction on bottom organisms. One sucker, the bigmouth buffalo, may grow to be 65 pounds, 4 feet long. Suckers are a significant part of the commercial and sport fishery.

E. Paddlefish - Polydontidae

The paddlefish swims with its mouth open. It is a filter feeder. It is found in silty rivers and oxbows and flood plain lakes. It may grow to be 6 feet long and weigh 150 lbs. It has a strongly upturned tail.

F. Gar Family - Lepisosteidae

The gars are ancient fish, armored and not easily caught. Gar-rodeos are held to capture them with wire snares. The gar feed on all kinds of fishes, living and dead. The gars have sharp, strong teeth.



A. Mooneye
B. Gizzard Shad
C. Pike
D. Sucker
E. Paddlefish
F. Gar

A. Sculpin Family - Cottidae

Sculpins have large spiny or armored heads. They live on the bottom, feeding on crabs and small fish. They are sometimes used as bait.

B. Silverside Family - Atherinidae

All are streamlined, and are surface feeders. They are used as bait but do not survive well in a pail. They are almost transparent. Boaters often see them skip in the air for a short distance.

C. Sunfish Family - Centrarchidae

The male sunfish guards the eggs. Many of the species in this family such as largemouth bass, smallmouth bass and bluegills, are important sport fish. Sunfish feed on aquatic invertebrates, fish, and frogs. They are protected from commercial exploitation.

D. Perch Family - Percidae

This group includes the yellow perch and the walleye, both of which are important in sport fishing. U.S. commercial fishermen in Lake Erie take in more perch than anything else.

E. Temperate Basses - Percichthidae

The white bass and the white perch are the temperate basses in Lake Erie. They often school at or near the surface. The white bass prefers quiet water over sand and gravel bottoms.

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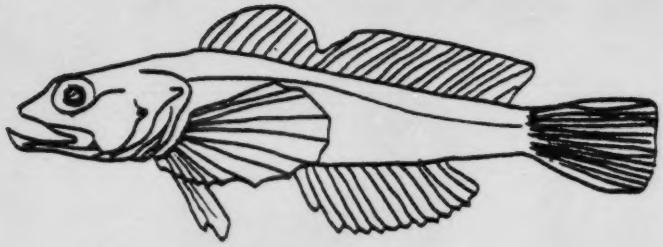

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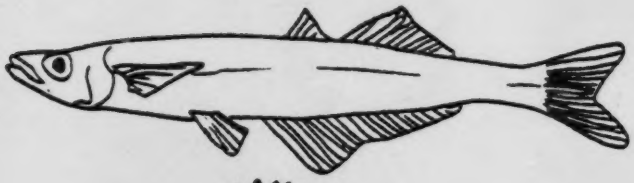

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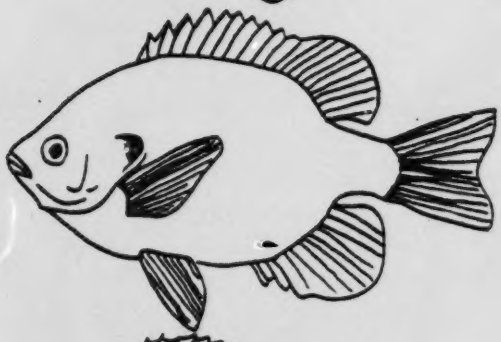

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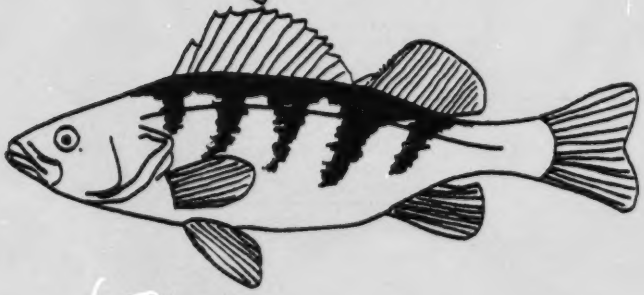

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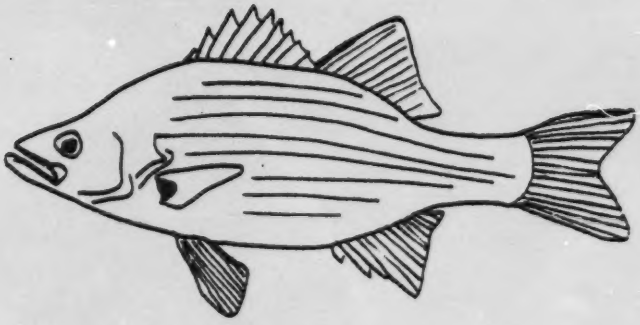


A. Sculpin
B. Silversides
C. Sunfish
D. Yellow perch
E. White Bass

II

III.

A. Mudminnow Family - Umbridae

The mudminnow is an omnivore. This fish will eat a wide variety of foods. It will dive into the bottom to escape from danger. It is very hardy and makes a good bait.

B. Killifish Family - Cyprinodontidae

The head is flattened on top toward the snout, and the mouth opens along the upper front edge of the head. The mouth is adapted to feeding at the surface. It is of some value as live bait and as a forage fish.

C. Pirate perch Family - Aphredoderidae

These are small fish, 4 inches long. They eat small fish and aquatic insects.

D. Bowfin Family - Amiidae

The bowfin lives in quiet water, feeding on fish, amphibians and crayfish. It has a long fin that arches in a bow over most of the length of the back of the fish.

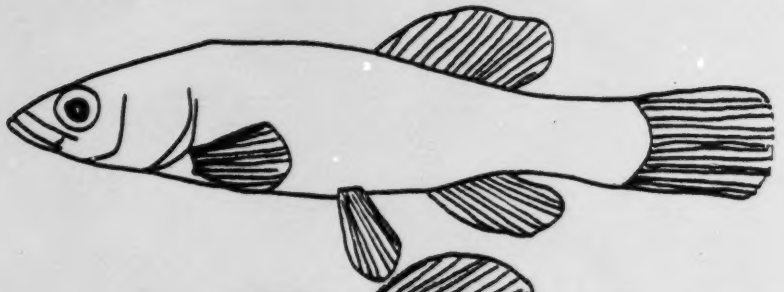
E. Livebearers Family - Poeciliidae

The Poeciliidae bear their young alive. The "mosquitofish" Gambusia feeds on the mosquito larvae which attach themselves to the surface film of the water.

F. Trout and Salmon Family - Salmonidae

Has extra fatty fin, (adipose). The Chinook Salmon can reach 100 pounds. The salmon is a valuable sport fish. Atlantic salmon were native to Lake Ontario but were exterminated by man's activities.

A.



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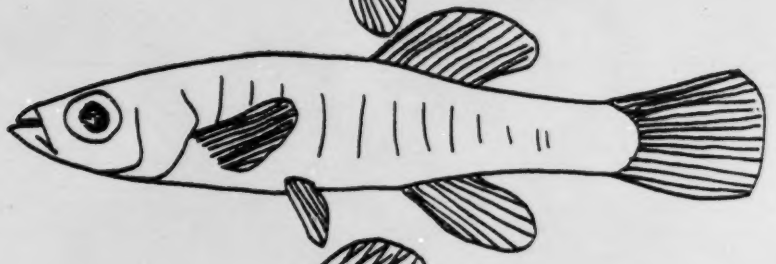

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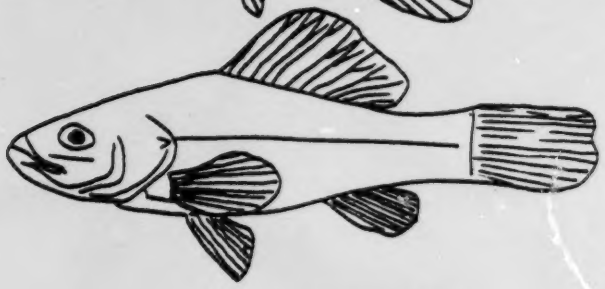

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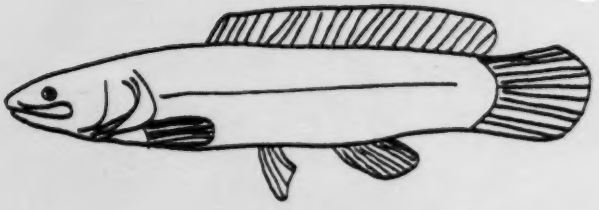

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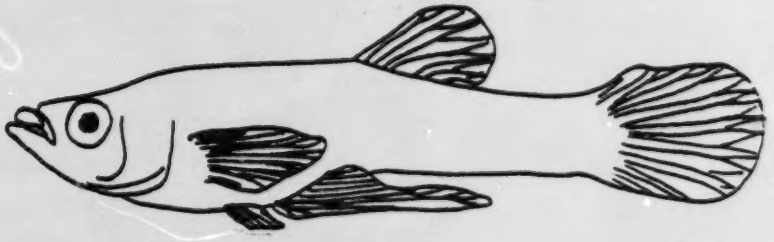

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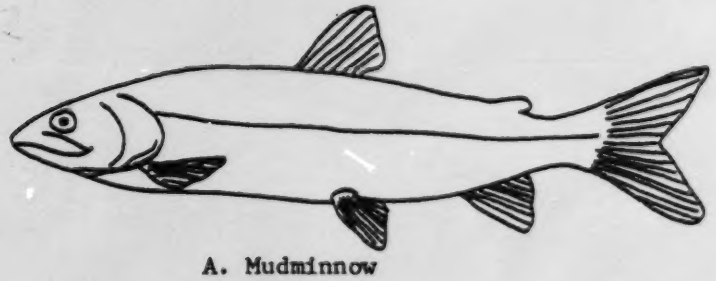


A. Mudminnow
B. Killifish
C. Pirate Perch
D. Bowfin
E. Livebearer
F. Salmon

III

IV.

A. Troutperch Family - Percopsidae

Has characteristics of the trout and the perch (adipose fin-trout; spined fins-perch). They are a forage fish.

B. Smelt Family - Osmeridae

The smelt is about 7-9 inches long. It eats small fish and invertebrates. It has an extra fatty fin (adipose fin).

C. Minnow Family - Cyprinidae

The minnows provide a major source of food for game and commercial fish. They are also widely used for bait.

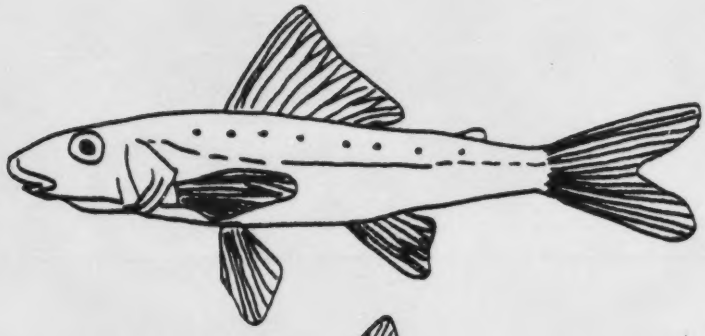
D. Stickleback Family - Gasterosteidae

Sticklebacks get their name from the stiff spines on their backs. They inhabit the quiet waters of streams and boggy situations.

E. Drum Family - Sciaenidae

This fish gets its name from the purring or drumming sound it makes. It has a lateral line that extends all the way across the tail fin. It is of some commercial value. Some fishermen call this fish the "sheepshead."

A.



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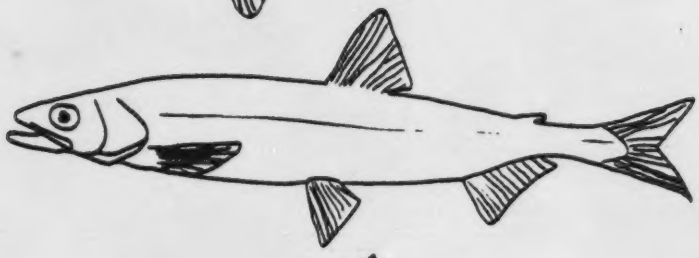

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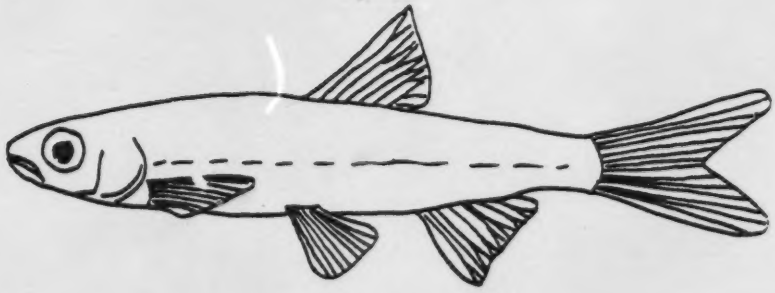

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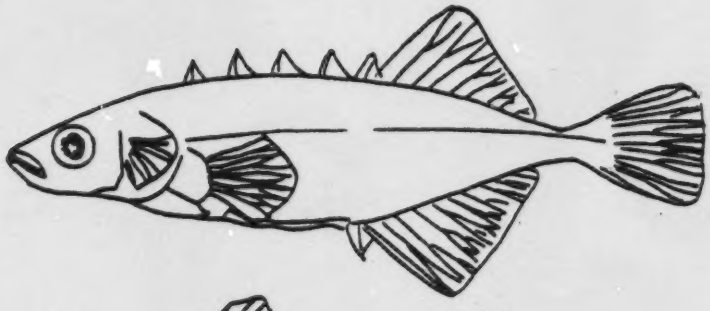

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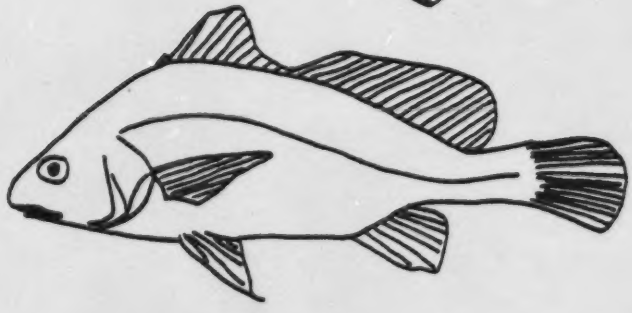


A. Troutperch
B. Smelt
C. Minnow
D. Stickleback
E. Drum

IV

V.

A. Cod Family - Gadidae

Cod have a single prominent barbel on the underside of the chin. Although not commercially valuable, the Great Lakes representative of the cod family is the burbot.

B. Catfish Family - Ictaluridae

These omnivorous fish use their barbels to locate food. They have no scales. Bullheads are small catfish. They live in muddy ponds and streams. They may survive even when ponds dry up. The male bullhead watches the nest and guards the young. The flathead catfish can be as large as 100 pounds. Fun to fish for, the catfish is a valuable sport and commercial fish. The little madtoms have venom glands at the base of their pectoral fins. They can cause a painful wound.

C. Minnow Family - Cyprinidae

The minnows provide a major source of food for game and commercial fish. They are also widely used for bait. The carp looks very different from other members of this family.

D. Sturgeon Family - Acipenseridae

The sturgeon is an ancient fish, covered with bony plates. It has sensitive feelers on the bottom of its mouth. The sucker-like mouth under a long snout is well adapted for working over the bottom and picking up food. The sturgeon sucks animals up through its tube-like mouth. It is a very desirable food fish.

E. Eel Family - Anguillidae

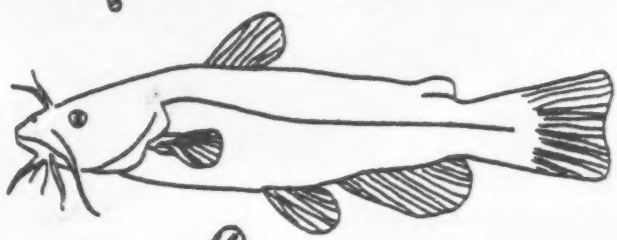
The eel is an omnivore. It has true jaws and a snake-like shape with no scales. It is good to eat. It feeds at night.

F. Lamprey Family - Petromyzontidae

This family has some parasitic and some non-parasitic members. The young of both types burrow into stream bottoms and stay there as filter feeders for 3-7 years. When they become adults, the non-parasitic lamprey reproduce and die. The adult parasitic lamprey uses its sucker mouth and rasping tongue to attach itself to another fish that it will feed on.

A.

B.



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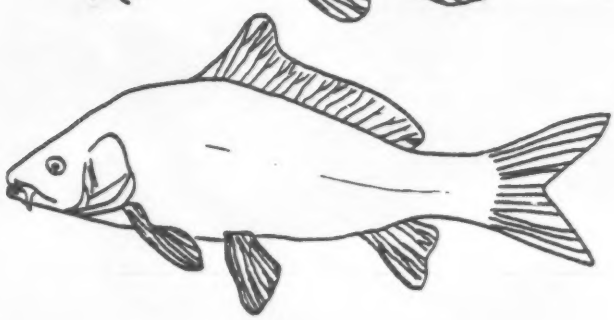

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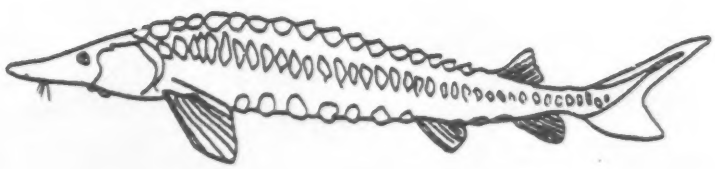

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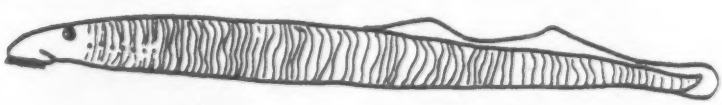

A. Burbot
B. Catfish
C. Carp
D. Sturgeon
E. Eel
F. Lamprey

V